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ABSTRACT

Does early child care hinder or enhance infants' and toddlers' social and cognitive development? This longitudinal study investigated whether: (1) child care is related to qualities of mother-child interaction and the child's cognitive and language development in the first 3 years of life; (2) the child care environment interacts with the home environment in prediction of these outcomes; and (3) specific characteristics of child care are related to outcomes in these two domains (cognitive and language development). Children (n=1,364) were assessed at 6, 15, 24, and 36 months of age. Assessments included observations of the child's child care environment, of the mother and child during a structured interaction, of the child's home environment, and standardized measures of cognitive and language development. Results indicated that selection, child, and family variables were consistently significant predictors of both mother-child interaction and cognitive and language outcomes. Child care variables consistently made an additional significant, though usually smaller, contribution to explaining individual differences in these outcomes. Quality of provider-child interaction was related to better cognitive and language scores and to more positive mother-child interactions. Amount of child care was associated with less sensitive and engaged mother-child interactions, but was unrelated to cognitive and language outcomes. (EV)

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Mother-Child Interaction and Cognitive Outcomes Associated with Early Child Care: Results of the NICHD Study

The NICHD Early Child Care Research Network

Poster symposium presented at the Biennial Meeting of the Society For Research in Child Development, Washington, D.C., April, 1997

ED 407 149

OVERALL SUMMARY

Does early child care hinder or enhance infants' and toddlers' social and cognitive development? This question lies at the core of the child care debate. In these posters, we present results from the NICHD Study of Early Child Care relating child care to mother-child interaction and to cognitive and linguistic development across the first three years of life. This longitudinal investigation was designed as an ecological study of children from birth through first grade to examine the nature of early caregiving experiences and the effects of those experiences upon development. With 1,364 socially and racially diverse children from 10 sites, the study allows investigation of child social and cognitive outcomes that emerge in multiple contexts, with multiple measures, at multiple points in development.

Across two different domains, mother-child interaction and children's cognitive and language development, three questions were addressed: 1) Is child care related to qualities of mother child interaction and the child's cognitive and language development in the first three years of life after considering variables related to both child care use and the outcomes (selection variables) and other family and child characteristics? 2) Does the child care environment interact with the home environment in prediction of these outcomes? and 3) What specific characteristics of child care are related to outcomes in these two domains?

Children were assessed at 6, 15, 24, and 36 months of age. Assessments included observations of the child's child care environment, of the mother and child during a structured interaction, of the child's home environment, and standardized measures of the child's cognitive and language development. The analysis model involved: selection variables (family characteristics related to both child care and outcome), child variables (gender and/or temperament), additional family variables related to the outcome, and child care variables (including both structural and process measures). Hierarchical regressions were used to examine the association between the selected child care variables and the outcomes in the two domains after selection, child, and family variables were controlled.

Results indicated that the selection, child, and family variables, entered before child care variables in our predictive equations, were consistently significant predictors of both mother-child interaction and cognitive and language outcomes. Child care variables consistently

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ERRATA

Mother-Child Interaction and Cognitive Outcomes Associated with Early Child Care: Results of the NICHD Study

In *The NICHD Study: Sample Characteristics*, Sampling Plan and Subject Recruitment, diamond number two, please change "24 hospitals" to read "31 hospitals."

In *Nonmaternal Child Care and Qualities of Mother-Child Interaction: Findings*, Summary of Regression Analyses of Cumulative Effects of Care, section two, delete "lower maternal sensitivity and child positive engagement with mother at 36 months."

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made an additional significant, though usually smaller, contribution to explaining individual differences in these outcomes. Child care variables, especially positive caregiving and language stimulation, contributed between 1.3% and 3.6% of the variance to early cognitive and language development in the first three years of life. However, all the predictors in the analysis accounted for between 5% and 41% of the variance. Similarly, in prediction of qualities of mother-child interaction, when significant, child care variables accounted for approximately .5% to 1% of the variance. However, all the predictors in analyses accounted for between 5% and 25% of the variance. Nonetheless, for both mother-child interaction and cognitive and language outcomes, there were consistent effects of child care variables, especially quality and quantity, after controlling for selection, family and child characteristics.

Major findings with regard to child care variables included:

Quality of provider-child interaction was related to better cognitive and language scores and to more positive mother-child interactions across the first three years. These effects were generally small, but statistically significant.

> Specifically, more positive caregiving and, especially, language stimulation in the child care setting were related to children's better performance on cognitive and language tests when they were 15, 24, and 36 months of age. More positive caregiving in the child care setting was related to more sensitivity and involvement of mothers observed with their children at 15 and 36 months.

Amount of child care was associated with less sensitive and engaged mother-child interactions across the first three years. Again, these effects were small, but significant. Amount of care was unrelated to the cognitive and language outcomes.

> Specifically, more hours of nonmaternal care were related to less sensitive play of the mother with the child at 6 and 36 months, more maternal negativity at 15 months, and less child affection toward the mother at 24 and 36 months. These findings seemed to hold particularly for the subgroup of mothers who were not at risk due to poverty or depression.

In summary, although family and child predictors generally contributed a larger proportion of total variance in predicting mother-child interaction and cognitive and language outcomes, child care predictors consistently explained an additional small, significant amount of variance. In other words, what is happening at home and in families appears to influence children's lives, both for those in child care and for those who are not. Still, child care variables provided additional, significant prediction of mother-child interaction and cognitive and language outcomes.

NICHD Early Child Care Research Network

Mark Appelbaum
University of California at San Diego
(619) 534-7959
(619) 534-7190 fax
mappelba@psy.ucsd.edu

Dee Ann Batten
Vanderbilt University
(615) 343-1476
(615) 343-1100 fax
battenda@ctrvax.vanderbilt.edu

Jay Belsky
Pennsylvania State University
(814) 865-1447
(814) 863-6207 fax
jxb@email.psu.edu

Kimberly Boller*
Mathematica Policy Research Institute
(609) 275-2341
(609) 799-0005 fax
kboller@mathematica-mpr.com

Cathryn Booth
University of Washington at Seattle
(206) 543-8074
(206) 685-3349 fax
ibcb@u.washington.edu

Robert Bradley
University of Arkansas at Little Rock
(501) 569-3423
(501) 569-8503 fax
rhbradley@ualr.edu

Celia Brownell
University of Pittsburgh
(412) 624-4510
(412) 624-4428 fax
brownell@vms.cis.pitt.edu

Margaret Burchinal
University of North Carolina at Chapel Hill
(919) 966-5059
(919) 962-5771 fax
burchina.fpg@mhs.unc.edu

Bettye Caldwell
Arkansas Children's Hospital
Department of Pediatrics
(501) 320-3333
(501) 320-1552 fax
bettyemc@care.ach.uams.edu

Susan Campbell
University of Pittsburgh
(412) 624-8792
(412) 624-5407 fax
preschl@vms.cis.pitt.edu

Alison Clarke-Stewart
University of California at Irvine
(714) 824-7191
(714) 824-3002 fax
acstewar@uci.edu

Martha Cox
University of North Carolina at Chapel Hill
(919) 966-3509
(919) 966-7532 fax
cox.fpg@mhs.unc.edu

Kaye Fendt
National Institute of Child Health and Human Development
(301) 594-5414

Sarah L. Friedman
National Institute of Child Health and Human Development
(301) 496-9849
(301) 480-7773 fax
friedmas@hd01.nichd.nih.gov

Kathryn Hirsh-Pasek
Temple University
(610) 642-5275
(215) 204-5539 fax
v5280e@vm.temple.edu email

Aletha Huston
University of Texas at Austin
(512) 471-0753
(512) 471-5844 fax
achuston@mail.utexas.edu

Elizabeth Jaeger
Temple University
(215) 204-7894
(215) 204-5539 fax
v1547g@vm.temple.edu

Bonnie Knoke
Research Triangle Institute
(919) 541-7075
(919) 541-5966 fax
knoke@rti.org

Nancy Marshall
Wellesley College
(617) 283-2551
(617) 283-2054 fax
nmarshall@wellesley.edu

Kathleen McCartney
University of New Hampshire
(603) 862-3168
(603) 862-4986 fax
kathleen.mccartney@unh.edu

Marion O'Brien
University of Kansas
(913) 864-4840
(913) 863-5202 fax
mobrien@falcon.cc.ukans.edu

Margaret Tresch Owen
University of Texas at Dallas
(972) 883-6876
(214) 883-2491 fax
mowen@utdallas.edu

Robert Pianta
University of Virginia at Charlottesville
(804) 243-5483
(804) 243-5480 fax
rcp4p@virgina.edu

Deborah Phillips
National Academy of Sciences
(202) 334-1935
(202) 334-3829 fax
phillips@nas.edu

Henry N. Ricciuti*
Cornell University
(607) 255-0844
(607) 255-9856 fax
hnr1@cornell.edu

Susan Spieker
University of Washington at Seattle
(206) 543-8453
(206) 685-3349 fax
spieker@u.washington.edu

Deborah Lowe Vandell
University of Wisconsin at Madison
(608) 263-1902
(608) 263-6448 fax
dvandell@macc.wisc.edu

Kathleen Wallner-Allen*
Research Triangle Institute
(301) 496-9849
(301) 480-7773 fax
wallnerk@hd01.nichd.nih.gov

Marsha Weinraub
Temple University
(215) 232-6572
(215) 204-5539 fax
v5242e@vm.temple.edu

* Affiliated with the NICHD during the course of the Early Child Care Study.

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Mother-Child Interaction and Cognitive Outcomes Associated with Early Child Care:

Results of the NICHD Study

NICHD Early Child Care Research Network

Mark Appelbaum, University of California at San Diego • Dee Ann Batten, Vanderbilt University • Jay Belsky, Pennsylvania State University • Kimberly Boller, National Institute of Child Health and Human Development • Cathryn Booth, University of Washington at Seattle • Robert Bradley, University of Arkansas at Little Rock • Celia Brownell, University of Pittsburgh • Margaret Burchinal, Frank Porter Graham Child Development Center • Bettye Caldwell, Arkansas Children's Hospital • Susan Campbell, University of Pittsburgh • Alison Clarke-Stewart, University of California at Irvine • Martha Cox, University of North Carolina at Chapel Hill • Kaye Fendt, National Institute of Child Health and Human Development • Sarah L. Friedman, National Institute of Child Health and Human Development • Kathryn Hirsh-Pasek, Temple University • Aletha Huston, University of Texas at Austin • Elizabeth Jaeger, Temple University • Bonnie Knoke, Research Triangle Institute • Nancy Marshall, Wellesley College • Kathleen McCartney, University of New Hampshire • Marion O'Brien, University of Kansas • Margaret Tresch Owen, University of Texas at Dallas • Deborah Phillips, National Academy of Sciences • Robert Pianta, University of Virginia at Charlottesville • Henry N. Ricciuti, National Institute of Child Health and Human Development • Susan Spieker, University of Washington at Seattle • Deborah Lowe Vandell, University of Wisconsin at Madison • Kathleen Wallner-Allen, Research Triangle Institute • Marsha Weinraub, Temple University

The NICHD Study: Background

Abstract

Does early child care hinder or enhance infants' and toddlers' social and cognitive development? This question lies at the core of the child care debate.

In these posters, we present results from the NICHD Study of Early Child Care relating child care to mother-child interaction and to cognitive and language development across the first 3 years of life. This longitudinal investigation was designed as an ecological study of children from birth through first grade, which investigates the nature of early caregiving experiences and the effects of those experiences upon development.

Across two different domains — mother-child interaction and children's cognitive and language development — three questions are addressed:

1. Is child care related to mother-child interaction and to cognitive development above and beyond the contribution of selection effects and family environment?
2. Does the child care environment interact with the home environment to affect the outcomes?
3. What characteristics of child care are responsible for the effects in these two domains?

kground for the Study

Dramatic change has taken place in the early experiences of the youngest children in the United States:

- Changes in child care patterns are related to increased employment among mothers of young children.
- More than half of the infants under 12 months of age receive care by someone other than their mothers.

Fundamental scientific and social policy questions have been raised about the effects of early child care experiences on children's development:

- Some argue that early child care poses risks for infants.
- Others assert that children thrive in child care when quality is high.
- Still others argue that early experiences do not alter developmental trajectories unless they are characterized by extreme deprivation.

Questions

Two over-arching questions motivate the NICHD Study of Early Child Care:

1. Under what circumstances do children thrive in child care? Under what circumstances is children's development compromised?
2. Through what processes does child care affect children's development?

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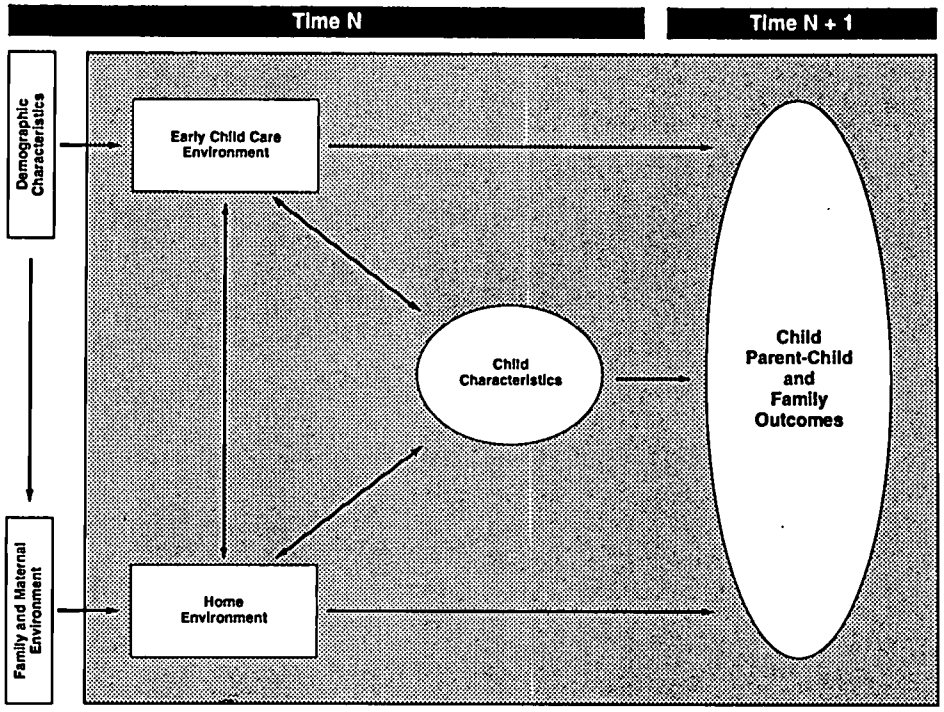
Figure 1: Relationships of Interest at Any Given Age and Over Time

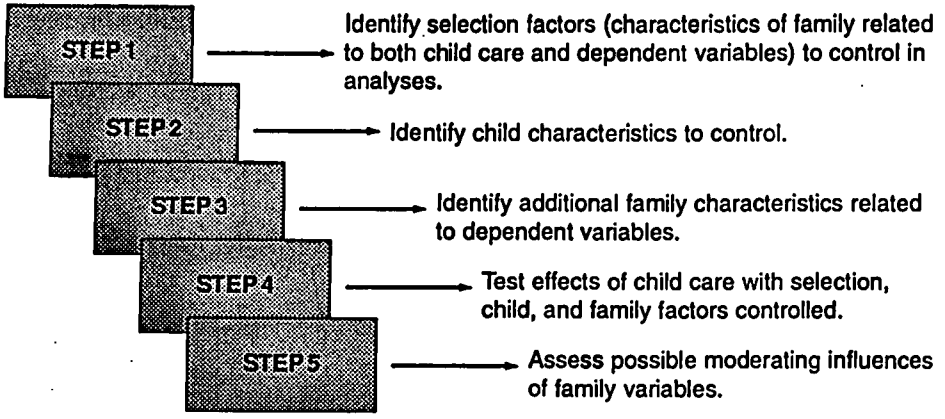


Ecological Model

Effects of child care depend on:

- Individual characteristics of child
- Characteristics of family and home environment
- Child care environment.

lysis Plan



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Constructs Measured

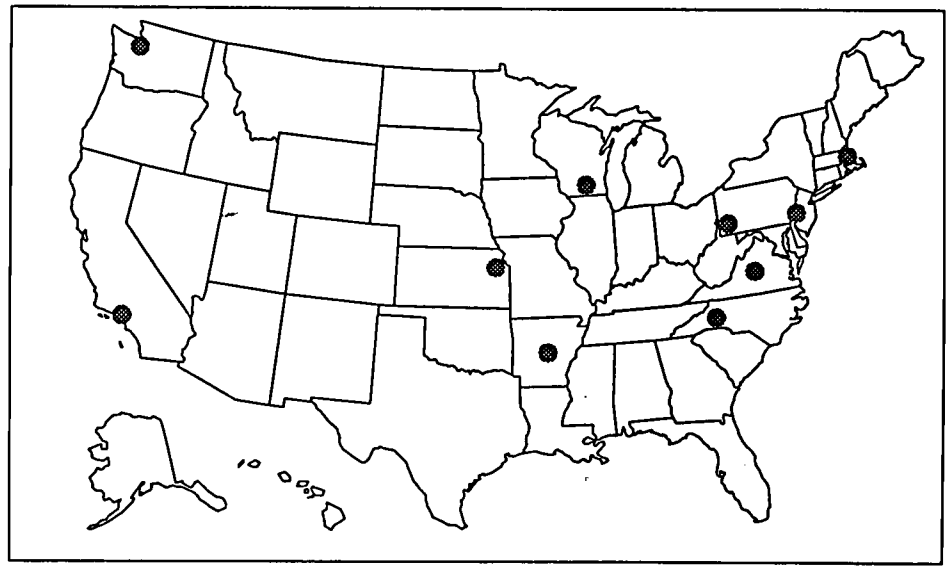
Construct	Time of Measurement (months) 1	6	15	24	36	54	FG
Socio-Emotional							
Quality of Relationships		●	●	●	●	●	●
Adjustment		●	●	●	●	●	●
Self Concept and Identity							●
Cognitive							
Global Intellectual Functioning			●	●	●	●	●
Knowledge and Achievement					●	●	●
Cognitive Processes			●	●	●	●	●
Language Development			●	●	●	●	●
Health	●	●	●	●	●	●	●
Alternate Care Context							
Structural Regulatables	●	●	●	●	●	●	●
Quantity	●	●	●	●	●	●	●
Stability	●	●	●	●	●	●	●
Quality	●	●	●	●	●	●	●
Caregiver Characteristics	●	●	●	●	●	●	●
Home/Family Context							
Structural Context	●	●	●	●	●	●	●
Quality of Homelife		●	●	●	●	●	●
Parent Characteristics	●	●	●	●	●	●	●
School Context							
Structural Context							●
School Curriculum							●
Child's Perceptions							●

The NICHD Study: Sample Characteristics

Sampling Plan and Subject Recruitment

- Sites selected by competitive review of proposals (scientific merit), not on basis of demography.
- Ten sites and the associated 24 hospitals define the sampling domain of the study.
- All births in study hospitals during the recruitment period define a *catchment* which is the "reference population of the study."
- Sampling designed to produce unbiased estimates of effects for the catchment while assuring adequate representation of major socio-demographic niches.

Location of Data Collection Sites



Sampling Procedure

- Random assignment of hospitals to sampling days
- On assigned dates, all births in 24 hours recorded
- Each mother contacted in hospital to determine
  - — Demographics
  - — Exclusionary characteristics
  - — Permission to be contacted in 2 weeks
- Birth lists from all sites sent to Data Coordinating Center
- Excluded families culled
- Randomized calling lists created to ensure inclusion of at least 10% of families with low income, low education, and single parents
- Calling lists returned to sites
- Mothers called in order from calling lists at 2 weeks post-birth for recruitment into study
- Four families recruited per week at each site
- Signed consent and official recruitment at 1-month home visit

Exclusionary Criteria

- Mother <18 at delivery
- Multiple birth
- Not fluent in English
- Family planning to move within 3 years
- Medical problems of baby or mother
- Adoption/foster placement of baby
- Mother refused 2-week call
- Family lives too far from data-collection site
- Family in other study
- Neighborhood not safe
- Baby in hospital 7+ days

Demographic Characteristics of Catchment Area and Recruited Sample

	Catchment (%)	Sample (%)
Education		
<12th grade	11.3	11.1
High school/GED	29.4	24.8
Some college	28.7	28.5
BA level	20.3	23.8
Postgraduate work	10.3	12.5
Mother's Ethnicity		
White	80.5	81.5
Black	13.6	13.0
Native American	0.5	0.3
Asian	2.7	2.3
Hispanic	2.2	2.3
Mixed	0.5	0.5
Partner at Home		
No	13.2	14.2
Yes	86.8	85.8
Work/School Plans		
<10 hours/week	26.7	22.8
10-30 hours/week	24.7	23.0
30 or more hours/week	48.6	54.1

Demographic Characteristics of the Sample Observed in Care

	At 15 Months	At 36 Months
Number of Families	N=645	N=678
Income-to-Needs	N=639	N=672
0-1(poverty)	9.4%	12.1%
>1-1.8 (near poverty)	15.3%	12.5%
>1.8 (nonpoor)	75.3%	75.4%
Maternal Education	N=645	N=678
No HS Degree	4.8%	6.2%
HS Degree or GED	18.1%	19.5%
Some College	35.5%	32.3%
College Degree	22.8%	23.3%
Post-Graduate Education	18.8%	18.7%
Child Ethnicity	N=645	N=678
White, Non-Hispanic	78.6%	79.7%
Black, Non-Hispanic	10.1%	9.7%
Hispanic	6.2%	6.3%
Other	5.1%	4.3%

	At 15 Months	At 36 Months
Child Gender	N=645	N=678
Male	51.9%	50.4%
Female	48.1%	49.6%
Two-Parent Family	N=644	N=677
Yes	80.1%	77.0%
No	19.9%	23.0%
Hours/Week in Care	N=645	N=678
0 – 9	6.7%	8.6%
10 – 19	8.5%	10.6%
20 – 29	14.3%	14.6%
30 +	70.5%	66.2%
Type of Care	N=645	N=678
Child Care Center	18.9%	40.6%
Child Care Home	30.7%	24.2%
Relative/in-Home Care	50.4%	35.3%

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Demographic Characteristics of the Whole Sample

	At 1 Month	At 15 Months	At 36 Months
Number of Families	N=1364	N=1240	N=1161
Income-to-Needs	N=1274	N=1231	N=1151
0-1 (poverty)	24.3%	16.7%	16.9%
>1-1.8 (near poverty)	5.2%	15.4%	13.0%
>1.8 (nonpoor)	60.4%	67.9%	70.1%
Maternal Education	N=1363	N=1240	N=1161
No HS Degree	10.2%	8.8%	8.9%
HS Degree or GED	21.1%	20.7%	20.6%
Some College	33.4%	33.6%	32.8%
College Degree	20.8%	21.7%	22.0%
Post-Graduate Education	14.5%	15.2%	15.7%
Child Ethnicity	N=1364	N=1240	N=1161
White, Non-Hispanic	76.4%	77.4%	78.6%
Black, Non-Hispanic	12.7%	11.7%	11.2%
Hispanic	6.1%	6.0%	5.9%
Other	4.8%	4.9%	4.4%

	At 1 Month	At 15 Months	At 36 Months
Child Gender	N=1364	N=1240	N=1161
Male	51.7%	51.3%	51.4%
Female	48.3%	48.7%	48.6%
Two-Parent Family	N=1364	N=1239	N=1159
Yes	76.5%	78.5%	77.6%
No	23.5%	21.5%	22.4%
Hours/Week in Care		N=1240	N=1161
0 – 9		35.3%	31.4%
10 – 19		8.5%	9.2%
20 – 29		10.2%	10.7%
30 +		46.0%	48.7%
Type Of Care		N=1240	N=1161
Child Care Center		11.3%	29.6%
Child Care Home		22.5%	20.2%
Relative/In-Home Care		36.3%	28.5%
Mother		29.9%	21.7%

Data Collection Schedule

- Major assessments were done at 1, 6, 15, 24, 36, and 54 months and will be done in first grade.
- Intervening phone contacts were made every 3 to 6 months.
- Questionnaires were completed in kindergarten.

The schedule of assessments is displayed in the table below.

Assessment Setting	Child Age (in months) 1	6	15	24	36	54	Grade K	1
◆ Home	●	●	●	●	●	●		●
◆ Child Care		●	●	●	●	●		
◆ Laboratory			●	●	●	●		●
◆ Phone	●	●	●●●	●●	●●●	●●●	●●	● ●
◆ Mailed Questionnaire							●	
◆ School								●

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The NICHD Study: Measurements of Child Care

Amount, Stability, and Type of Care

Amount of Care

- Information provided by mothers in telephone calls
- Averages for weekly hours of care determined
- Amount calculated as mean of weekly hours of care during a given epoch (e.g., 0–6, 0–15, 0–24, 0–36 months)

Children who experienced no nonmaternal care across epochs received scores of 0.

Stability of Care

- Number of arrangements started across epochs (e.g., 0–6, 0–15, 0–24, 0–36 months)
- Determined from mother's report of changes in child-care arrangements

Type of Care

Type of child-care arrangement was assessed at 5, 14, 23, and 35 months. Type of care was designated for the care arrangement in which the child was observed as follows:

- Relative/In-Home Care
  - Father
  - Relative
  - In-home/nonrelative care
- Child Care Home
- Child Care Center

Child Care Quality

Quality of Care

Observational Record of the Caregiving Environment (ORCE)

- Behavioral scales: Frequency counts of specific caregiving acts with the child
- Qualitative ratings: Ratings of the quality of the caregiver's behavior in relation to the child

The scales are substantially similar at all assessment ages, but minor modifications were made to accommodate the increasing developmental complexity of the caregiver-child interactions.

ORCE General Procedure

- Four 44-minute cycles of observations
- Trained, reliable observers
- Observations took place over 2 days, within 2 weeks

ORCE Ratings of Positive Caregiving

Ratings completed at the end of each 44-minute cycle.

- Sensitivity/responsiveness to nondistressed communication
- Stimulation
- Positive regard
- Detachment/disengagement
- Flat affect
- Intrusiveness (at 36 months)
- Fosters exploration (at 36 months)

Composites were formed from ratings to create assessment of overall quality of care.

ORCE Behavior Scales

Frequencies:

- Shared positive affect
- Positive physical contact
- Responds to vocalization/child's talk
- Speaks positively to child
- Asks questions of child
- Other talk to child
- Stimulates cognitive development/teaches academic skill
- Facilitates behavior
- Mutual exchange
- Negative/restricting actions (reversed)
- Speaks negatively to child (reversed)
- Child watching/unoccupied/transition (reversed)

The NICHD Study: Nonmaternal Child Care and Qualities of Mother-Child Interaction

Aims

The next two posters examine issues pertaining to the association between the use of nonmaternal child care and global qualities of mother-child interaction.

- Cumulative and lagged effects of amount, stability, and quality of nonmaternal child care on mother-child interaction at 6, 15, 24, and 36 months.
- Qualities of mother-child interaction in various child-rearing niches, defined by family risk and child-care quantity and quality.

Key Questions

1. Do hours in nonmaternal care predict mother-child interaction in the first 3 years of life?
2. Among families using child care, do hours in care, stability of care, and quality of nonmaternal child care predict mother-child interaction in the first 3 years?
3. What are the effects of full-time child care on mother-child interaction for families who differ by poverty status and maternal depression?
   - Does full-time child care — particularly high-quality care — buffer risk conditions for mother-child interaction?
   - Does full-time child care — particularly low-quality care — add risk for mother-child dyads at risk?
   - Does full-time child care introduce risk for mother-child dyads not at risk?

Background

- The study of associations between child care and mother-child interaction addresses how the ecology of child rearing, child care, and family interact.
- Some investigators hypothesize risks to the establishment of sensitive mother-infant interactions associated with early extensive child care.
- Others hypothesize benefits of child care for family processes, especially under conditions of adversity in which child care can serve as a source of support.
- Parameters of child care (e.g., amount, quality) may have positive effects on family processes in some families and negative effects in others.
- In addition to examining main effects of care, analytic models must test how care and family processes combine to affect mother-child relationships.

Analysis Plan

Regression Analyses

- Examined effects of child-care experience, cumulated over epochs of 0–6, 0–15, 0–24, and 0–36 months — "cumulative effects"
  - Prediction of mother-child interaction from child-care variables when selection, child, and family variables controlled
  - Hours of nonmaternal care examined for whole sample, including those with 0 hours
  - Hours, stability, and quality of nonmaternal care examined for subsample observed in child care
- Examined effects of child-care experience in earlier epochs on later mother-child interaction — "lagged effects"
  - Prediction from earlier care experiences (e.g., 0 – 6 months) to later measured outcomes (e.g., 36-month mother-child interaction), after selection, child and family variables controlled

Analysis Plan

Planned Comparisons within Childrearing Niches:

Full-time Care (high- and low-quality) vs. No Care under Conditions of Risk

Specific predictions tested full-time nonmaternal care and its quality versus no regular nonmaternal care under high- and low-risk conditions.

No care = average hours of care across epoch <10
Full-time care = average hours of care across epoch ≥30

1. Under higher-risk conditions:
   - Does full-time care buffer risk? or add risk?
     Full-time > < no care?
   - Does full-time, higher-quality care buffer risk?
     Full-time higher-quality > no care?
   - Does full-time, lower-quality care add risk?
     Full-time lower-quality < no care?
2. Under lower-risk conditions:
   - Does full-time care diminish resources and introduce risk?
     Full-time < no care?
   - Does full-time, lower-quality care add risk?
     Full-time lower-quality < no care?

Two Risk Conditions Examined

Maternal depression	(high risk = upper quartile CES-D)
Poverty	(high risk = <1.8 average income/needs)

dictor Variables

1. **Covariates**

   Selection Variables — variables correlated with both child-care and mother-child interaction

   - Income-to-needs ratio
   - Maternal education

   Child Variables

   - Child gender
   - Difficult temperament

   Family Variables related to dependent variables

   - Two-parent family status
   - Maternal separation anxiety
   - Maternal depression

2. **Child Care**
   - Hours: Weekly hours averaged for epoch
   - Stability: Number of starts
   - Quality: Positive caregiving rating

Outcome Variables

Qualities of Mother-Child Interaction at 6 and 15 months

- **Maternal Sensitivity**

  Composited ratings of 15-min videotaped play

  – Sensitivity to nondistress signals

  – Positive regard of infant

  – Intrusive play (reflected)

  alphas = .75, .70

  reliabilities = .87, .83

- **Positive Involvement**

  HOME (Caldwell & Bradley) subscale (factor-analytically derived) rated from home interview and observation

  – Spontaneously vocalizes

  – Responds verbally to child

  – Initiates verbal interaction

  – Voices positive feelings for child

  – Hugs/kisses child

  – Watches child (praises child)

  alphas = .52, .56

- **Lack of Negativity (at 15 months only)**

  HOME subscale (factor-analytically derived)

  – Does not shout at child

  – Is not hostile

  – Does not slap/spank

  – Does not criticize

  – Does not interfere

  – Punishes physically <2/week

  alpha = .54

Outcome Variables

Qualities of Mother-Child Interaction at 24 and 36 months

Composited ratings of 15-min videotaped play

- **Maternal Sensitivity**
  at 24 months
  - Sensitivity to nondistress signals
  - Intrusiveness (reversed)
  - Positive regard of child

  alpha = .74

  reliability = .84

  at 36 months
  - Supportive presence
  - Respect for autonomy
  - Hostility (reversed)

  alpha = .78

  reliability = .84

- **Child Positive Engagement**
  at 24 months
  - Child engagement with mother
  - Child positive mood

  alpha = .66

  reliability = .76

  at 36 months
  - Child affection for mother
  - Child negativity (reversed)

  alpha = .61

  reliability = .77

Nonmaternal Child Care and Qualities of Mother-Child Interaction: Findings

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Lagged Effects of Amount of Child Care in Each Epoch for Mother-Child Interaction at 36 Months

	Maternal Sensitivity 36 Months (n=1023)	Child Engagement 36 Months (n=1023)
Covariates 0 – 6	**.211*** **	**.067*** **
Child Care 0 – 6	**.009*** **	**.005***
Hours	-.10*	-.08*
Family 7 – 15	**.008***	**ns**
Child Care 7 – 15	**ns**	**ns**
Hours	-.05	-.01
Family 16 – 24	**.009****	**ns**
Child Care 16 – 24	**Red.**	**ns**
Hours	-.03	-.03
Family 25 – 36	**.001**	**.005***
Child Care 25 – 36	**Red.**	**ns**
Hours	.02	-.07
Adjusted R^2 Total	**.235**	**.077**

* p<.05
** p<.01
*** p<.001

NOTE: Bold type denotes adjusted R^2 at point of entry.
Red. denotes reduction in R^2 at point of entry.
Plain type denotes beta in final model.
ns = nonsignificant.
Effects for 6-month hours on maternal sensitivity remain significant when 6-month sensitivity added to covariates block.
Family = maternal depression, separation anxiety, and 2-parent status in given epoch.
Covariates 0–6 = selection, child, and family covariates 0–6.

Regression Results for Models for Cumulative Effects of Child Care on Mother-Child Interaction

	6 Months				15 Months					
	Maternal Sensitivity		Positive Involvement		Maternal Sensitivity		Positive Involvement		Lack of Negativity	
	Whole (n=1266)	Observed (n=578)	Whole (n=1273)	Observed (n=581)	Whole (n=1216)	Observed (n=742)	Whole (n=1214)	Observed (n=739)	Whole (n-1214)	Observed (n-739)
Covariates	**.193*****	**.158*****	**0.87*****	**.066****	**.214*****	**.188*****	**.091*****	**0.78*****	**.121*****	**.119*****
Child Care	**.004****	**Red.**	**Red.**	**.017***	**.001**	**Red.**	**.001**	**.007***	**.006****	**Red.**
Hours	-.07*	-.05	.00	-.11*	-.03	-.05	.04	.07*	-.08*	-.02
Stability	—	.00	—	.03	—	.02	—	-.03	—	.03
Quality	—	-.02	—	.06	—	.00	—	.09*	—	.05
Adjusted R^2 Total	**.197**	**.155**	**.086**	**.082**	**.214**	**.187**	**.092**	**.086**	**.127**	**.119**

* p<.05
** p<.01
*** p<.001

NOTE: Red. denotes reduction in R^2.
Bold type denotes R^2.
Plain type denotes beta.
— denotes not applicable for the whole sample

Regression Results for Cumulative Models for Effects of Child Care on Mother-Child Interaction

	24 Months				36 Months			
	Maternal Sensitivity		Child Engagement		Maternal Sensitivity		Child Engagement	
	Whole (n=1150)	Observed (n=803)	Whole (n=1150)	Observed (n=803)	Whole (n=1139)	Observed (n=870)	Whole (n=1139)	Observed (n=870)
Covariates	**.200*****	**.191*****	**.072*****	**.052*****	**.242*****	**.210*****	**.088*****	**.072****
Child Care	**ns**	**Red.**	**.002***	**ns**	**006****	**.010****	**.005***	**.006***
Hours	.01	-.02	-.06*	-.06	-.09*	-.06	-.08*	-.06
Stability	—	-.01	—	.04	—	.01	—	.02
Quality	—	.03	—	-.03	—	.10*	—	.07*
Adjusted R^2 Total	**.200**	**.189**	**.074**	**.052**	**.248**	**.220**	**.093**	**.078**

* p<.05
** p<.01
*** p<.001

NOTE: Red. denotes reduction in R^2.
Bold type denotes R^2.
Plain type denotes beta.
— denotes not applicable for the whole sample

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Adjusted Means and Planned Comparisons of Care Groups for Low-Risk — Nondepressed Mothers

	Care Groups				Comparisons			
	No Care (NC)	Full-time (FT)	HiQual (FT/HQ)	LoQual (FT/LQ)	NC v FT	NC v FT/HQ	NC v FT/LQ	FT/HQ v FT/LQ
ensitivity 6	9.44	9.05	9.10	9.00	**	*	**	ns
ositive Involvement 6	5.42	5.56	5.59	5.53	*	*	ns	ns
ensitivity 15	9.53	9.41	9.39	9.43	ns	ns	ns	ns
ositive Involvement 15	5.58	5.64	5.69	5.58	ns	ns	ns	ns
ack of Negativity 15	5.23	5.05	5.10	4.99	*	ns	*	ns
ensitivity 24	9.50	9.52	9.45	9.59	ns	ns	ns	ns
hild Engagement 24	5.79	5.67	5.62	5.74	ns	ns	ns	ns
ensitivity 36	17.69	17.22	17.38	17.21	*	ns	*	ns
hild Engagement 36	11.57	11.01	10.91	11.10	*	*	*	ns

* p<.05
** p<.01
ns = nonsignificant
NC = No Care (<10 hr weekly average)
FT = Full-time Care (>30 hr weekly average)
T/HQ = Higher-Quality Full-time Care
T/LQ = Lower-Quality Full-time Care

NOTE: Means are adjusted for income-to-needs, maternal education, child gender, 2-parent status, and separation anxiety.

Adjusted Means and Planned Comparisons of Care Groups for Low-Risk — Nonpoverty Families

	Care Groups				Comparisons			
	No Care (NC)	Full-time (FT)	HiQual (FT/HQ)	LoQual (FT/LQ)	NC v FT	NC v FT/HQ	NC v FT/LQ	FT/HQ v FT/LQ
ensitivity 6	9.54	9.14	9.12	9.17	**	**	*	ns
ositive Involvement 6	5.46	5.57	5.57	5.57	ns	ns	ns	ns
ensitivity 15	9.69	9.47	9.41	9.53	ns	ns	ns	ns
ositive Involvement 15	5.59	5.67	5.70	5.63	ns	ns	ns	ns
ack of Negativity 15	5.20	5.04	5.09	4.98	ns	ns	*	ns
ensitivity 24	9.43	9.50	9.42	9.59	ns	ns	ns	ns
hild Engagement 24	5.80	5.63	5.56	5.70	ns	ns	ns	ns
ensitivity 36	18.05	17.15	17.15	17.15	*	*	*	ns
hild Engagement 36	11.63	11.03	11.01	11.06	*	*	*	ns

* p<.05
** p<.01
ns = nonsignificant
NC = No Care (<10 hr weekly average)
FT = Full-time Care (>30 hr weekly average)
T/HQ = Higher-Quality Full-time Care
T/LQ = Lower-Quality Full-time Care

NOTE: Means are adjusted for maternal education, child gender, 2-parent status, maternal depression, and separation anxiety.

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Adjusted Means and Planned Comparisons of Care Groups for High-Risk — Low-Income Families

	Care Groups				Comparisons			
	No Care (NC)	Full-time (FT)	HiQual (FT/HQ)	LoQual (FT/LQ)	NC v FT	NC v FT/HQ	NC v FT/LQ	FT/HQ v FT/LQ
ensitivity 6	9.02	9.01	9.07	8.95	ns	ns	ns	ns
ositive Involvement 6	5.24	5.36	5.59	5.14	ns	*	ns	*
ensitivity 15	8.98	9.06	9.23	8.92	ns	ns	ns	ns
ositive Involvement 15	5.39	5.46	5.57	5.38	ns	ns	ns	ns
ack of Negativity 15	5.08	4.94	5.02	4.88	ns	ns	ns	ns
ensitivity 24	9.19	9.08	9.43	8.79	ns	ns	ns	ns
hild Engagement 24	5.54	5.25	5.45	5.08	ns	ns	*	ns
ensitivity 36	16.67	16.71	17.30	16.31	ns	ns	ns	ns
hild Engagement 36	10.97	10.98	10.85	11.06	ns	ns	ns	ns

* p<.05
ns = nonsignificant
NC = No Care (<10 hr weekly average)
FT = Full-time Care (>30 hr weekly average)
T/HQ = Higher-Quality Full-time Care
FT/LQ = Lower-Quality Full-time Care

NOTE: Means are adjusted for maternal education, child gender, 2-parent status, maternal depression, and separation anxiety.

Adjusted Means and Planned Comparisons of Care Groups for High-Risk Families — High Maternal Depressive Symptoms

	Care Groups				Comparisons			
	No Care (NC)	Full-time (FT)	HiQual (FT/HQ)	LoQual (FT/LQ)	NC v FT	NC v FT/HQ	NC v FT/LQ	FT/HQ v FT/LQ
ensitivity 6	9.08	9.19	8.95	9.47	ns	ns	ns	ns
ositive Involvement 6	5.28	5.34	5.43	5.23	ns	ns	ns	ns
ensitivity 15	9.20	9.13	9.04	9.22	ns	ns	ns	ns
ositive Involvement 15	5.36	5.54	5.51	5.56	ns	ns	ns	ns
ack of Negativity 15	4.96	4.89	4.88	4.89	ns	ns	ns	ns
ensitivity 24	9.05	9.00	9.13	8.87	ns	ns	ns	ns
hild Engagement 24	5.43	5.17	5.38	4.99	ns	ns	*	ns
ensitivity 36	16.67	16.32	16.36	16.25	ns	ns	ns	ns
hild Engagement 36	11.00	11.00	11.10	10.90	ns	ns	ns	ns

* p<.05
ns = nonsignificant
NC = No Care (<10 hr weekly average)
FT = Full-time Care (>30 hr weekly average)
T/HQ = Higher-Quality Fulltime Care
T/LQ = Lower-Quality Fulltime Care

NOTE: Means are adjusted for income-to-needs, maternal education, child gender, 2-parent status, and separation anxiety.

Summary of Regression Analyses of Cumulative Effects of Care

In the whole sample, *do hours of nonmaternal care predict qualities of mother-child interaction?*

- More hours of care predict
  - lower maternal sensitivity at 6 and 36 months
  - more maternal negativity at 15 months
  - lower child positive engagement with mother at 24 and 36 months

For children in care, *do hours, stability, and quality of care predict qualities of mother-child interaction?*

- More hours of care predict
  - lower maternal positive involvement at 6 months
  - lower maternal sensitivity and child positive engagement with mother at 36 months

  but
  - more positive maternal involvement at 15 months
- Higher quality of care predicts
  - more positive maternal involvement at 15 months
  - more maternal sensitivity and child positive engagement with mother at 36 months

Summary of Regression Analyses of Lagged Effects of Care

In the whole sample, *do hours of nonmaternal care from earlier time periods predict subsequent qualities of mother-child interaction?*

- More hours of care in the 0- to 6-month period predict
  - lower maternal sensitivity at 36 months
  - lower child positive engagement at 36 months
- Effects remain significant for 0–6 hours of care when 6-month maternal sensitivity is controlled.

Summary of Planned Comparisons of High-Risk Mothers

No Care

Full-time High Quality

Full-time Low Quality

Does use of full-time child care — particularly high-quality care — buffer effects of risk conditions for mother-child interaction?

- Low-income mothers using full-time higher-quality care had higher positive involvement at 6 months than low-income mothers not using care or those using lower-quality full-time care.
- No buffering effects of care found for mothers with high depressive symptoms.

Does use of full-time care add risk when mothers are at risk?

- Engagement was lower at 24 months for children of high-risk mothers in full-time lower-quality care than for children of mothers not using care.

Summary of Planned Comparisons of Low-Risk Mothers

No Care

Full-time High Quality

Full-time Low Quality

When mothers are not at risk, does use of full-time care introduce risk to mother-child interaction?

- Low-risk mothers (nondepressed and nonpoverty) were more sensitive at 6 and 36 months when not using care than when using full-time care, regardless of its quality.
- When not in care, children of low-risk mothers showed more positive engagement with mother at 36 months than when in full-time care, regardless of its quality.
- Low-risk mothers were more negative at 15 months when using lower quality full-time care than when not using care.

But

- Similar to high-risk (low-income) mothers, nondepressed mothers using full-time higher-quality care were more positively involved at 6 months than nondepressed mothers not using care.

Conclusions

1. Family and child characteristics were consistent predictors of mother-child interaction. Compared with their influences, child care was a much smaller contributor to qualities of mother-child interaction in the first 3 years.
   - When significant, child care predicted approximately .5% to 1% of the total variance. Of the variance accounted for, on average only 6.5% was attributable to care.
2. Nonetheless, where child-care effects were found, findings were consistent
   - Amount of child care was negatively related to mother-child interaction
     - For the whole sample (and, for the most part, for the sample of families using nonmaternal care), more hours of nonmaternal child care were related to less sensitive play of the mother with her child at 6 and 36 months and more negative interactions with her child at 15 months.
     - In addition, children were less positively engaged with their mothers during play at 24 and 36 months when they spent more hours in nonmaternal care.
     - Negative effects of hours in the first 6 months showed a persistent effect at 36 months on mother-child interaction.
     - Mirroring findings for the whole sample, among nonpoverty and nondepressed mothers, higher qualities of mother-child interaction were observed at 36 months when mothers used no regular child care than when they used full-time care across the first 3 years.

- Quality of care was related to mother-child interaction
  - When higher-quality child care was used, mothers were more positively involved at 15 months than when care was lower in quality. In addition, mothers were more sensitive and their children were more positively engaged at 36 months when child care was higher in quality.
  - For low-income mothers, use of higher-quality full-time care was related to greater maternal positive involvement at 6 months, relative to no care.
  - Lower-quality full-time care constituted an additional risk for the child's positive engagement with mother at 24 months, relative to no care, for children of high-risk mothers.

In summary, these findings suggest that beyond the more consistent and pervasive effects of family, maternal, and child characteristics on qualities of mother-child interaction, child care hours and quality make additional, though small, contributions.

Cognitive and Linguistic Outcomes: Background

Aim

The next two posters examine the extent to which child care is related to cognitive and language outcomes during the first 3 years of life after adjusting for selection, child, and family characteristics.

Background

Intervention Studies

- These studies focus on high-quality programs offered to children from impoverished families.
- The findings consistently demonstrate positive effects of child care on a range of cognitive and language outcomes and long-lasting effects on academic outcomes.

Naturalistic Studies

- These studies have typically focused on the effects of preschool care on cognitive performance in white middle-class children.
- Empirical results are mixed showing no effects of care on cognition and language, positive effects on both cognition and language, or sometimes negative effects of care on these outcomes.

y Questions

1. Does quality of care predict cognitive and language outcome measures in the first 3 years of life?
   - ◆ Quality measured by positive caregiving ratings
   - ◆ Quality measured by frequency of language stimulation
2. Do hours in care and type of care predict cognitive and language outcomes in the first 3 years of life?
3. Does child care affect boys and girls differently?
4. Do child-care experiences predict differently for children who vary by:
   - ◆ family income?
   - ◆ home environment?
   - ◆ ethnicity?

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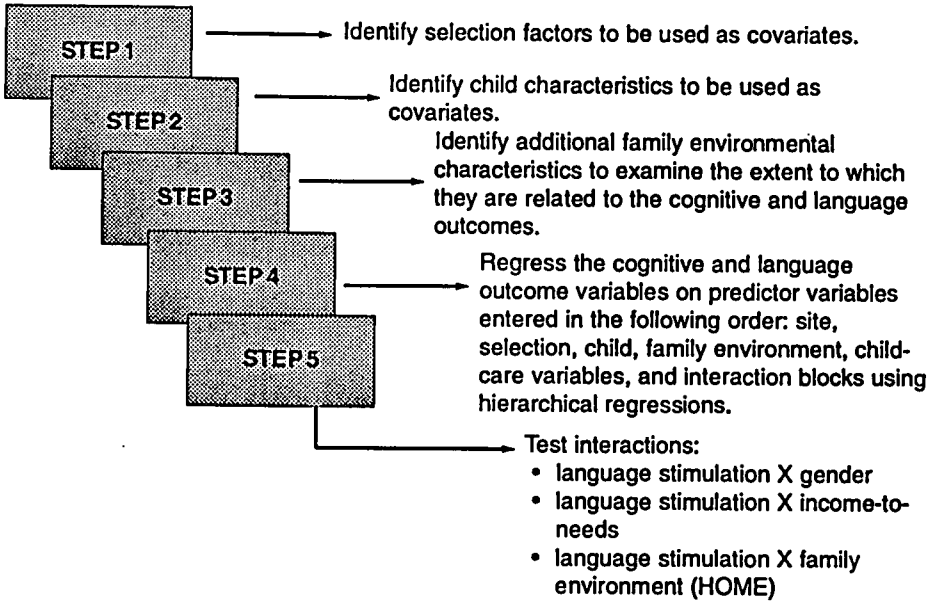
Analysis Plan

Cumulative Analyses for Subsample of Children Observed in Their Care Environment



dictor Variables

1. **Covariates**

Selection Variables

- Maternal vocabulary (Peabody Picture Vocabulary Test)
- Income-to-needs: Family income (exclusive of welfare payment) divided by the poverty threshold for a family of a given size

Child Gender

Family Variables

- HOME Total Score: Observed stimulation and support available to child in home environment
- Maternal stimulation: Rated on a 4-point scale from videotapes with 15 min of mother-child interaction during play

2. **Child Care**

- Hours: Mean number of hours of care per week from birth through the age at which the outcome measure was collected
- Type:
  Child-Care Center: Number of times child observed in center care prior to and including the assessment period (e.g., at 6 and 15 months, for 15-month outcomes)
  Child-Care Home: Number of times child observed in child-care home prior to and including the assessment period
- Quality of provider-child interaction
  - Positive caregiving:
    A composite variable from ORCE Rating Scales:
    - Sensitivity to nondistress
    - Stimulation of cognitive development
    - Positive regard
    - Detachment (reflect)
    - Flatness of affect (reflected)
  - Frequency of language stimulation:
    A composite variable from ORCE Behavior Scales
    - Asks questions of child
    - Responds to child vocalization
    - Other talk to child

Outcome Variables

- **At 15 Months**
  - Bayley Scales of Infant Development:
    Standardized developmental assessment yielding
    Mental Developmental Index (MDI)
  - MacArthur Communicative Development Inventory (CDI):
    Standardized questionnaire completed by mother yielding
    - produced vocabulary
    - comprehended vocabulary

- **At 24 Months**
  - Bayley Scales of Infant Development (Revised):
    Standardized developmental assessment yielding
    Mental Developmental Index (MDI)
  - MacArthur Communicative Development Inventory (CDI):
    Standardized questionnaire completed by mother yielding
    - produced vocabulary
    - sentence complexity

- **At 36 Months**
  - Bracken Scale of Basic Concepts:
    School Readiness Composite:
    Standardized developmental assessment yielding
    School Readiness Composite
  - Reynell Developmental Language Scale (RDLS):
    Standardized developmental assessment yielding
    - comprehended vocabulary
    - expressive language

Cognitive and Linguistic Outcomes: Results and Discussion

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Performance at Age 15 Months: Standardized Regression Coefficients and Adjusted R^2 from Analyses Predicting Cognitive and Language

Entered before child care predictors: Site, Selection (Maternal Vocabulary, Income/Needs), Gender, Home (Total HOME, Observed Maternal Cognitive Stimulation)

Child Care Predictors:

Model 1: Hours, type, observed positive caregiving rating

Model 2: Model 1 + observed frequency of language stimulation

	Bayley MDI		Vocabulary Produced		Vocabulary Comprehended	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Adjusted R^2 for covariates		.129*		.037*		.013*
Adjusted R^2 for all child-care variables		.013*		.032*		.036*
Average hours/week in child care 0-15 mo	ns	ns	ns	ns	ns	ns
# times in center 6, 15 mo	ns	ns	ns	.109*	ns	ns
# times in child care home 6, 15 mo	ns	ns	ns	ns	ns	ns
Observed rating of positive caregiving 6, 15 mo	ns	ns	.124*	ns	.147*	ns
Observed frequency of language stimulation 6, 15 mo	—	.172*	—	.245*	—	.176*
Total adjusted R^2 for selection, gender, home, child care		.142*		.068*		.049*

ns = nonsignificant.
* = $p<.05$
— not in model

Performance at Age 24 Months: Standardized Regression Coefficients and Adjusted R^2 from Analyses Predicting Cognitive and Language

Entered before child care predictors: Site, Selection (Maternal Vocabulary, Income/Needs), Gender, Home (Total HOME, Observed Maternal Cognitive Stimulation)

Child Care Predictors:

Model 1: Hours, type, observed positive caregiving rating

Model 2: Model 1 + observed frequency of language stimulation

	Bayley MDI		Vocabulary Produced		Sentence Complexity	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Adjusted R^2 for covariates		.269*		.053*		.110*
Adjusted R^2 for all child-care variables		.032*		.023*		.016*
Average hours/week in child care 0-24 mo	ns	ns	ns	ns	ns	ns
# times in center 6, 15, 24 mo	.172*	.197*	ns	.103*	ns	.101*
# times in child care home 6, 15, 24 mo	.077*	.100*	ns	ns	ns	ns
Observed rating of positive caregiving 6, 15, 24 mo	.160*	ns	ns	ns	.118*	ns
Observed frequency of language stimulation 6, 15, 24 mo	—	.141*	—	.234*	—	.162*
Total adjusted R^2 for selection, gender, home, child care		.301*		.076*		.126*

ns = nonsignificant.
* = $p<.05$
— not in model

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Performance at Age 36 Months: Standardized Regression Coefficients and Adjusted R^2 from Analyses Predicting Cognitive and Language

Entered before child care predictors: Site, Selection (Maternal Vocabulary, Income/Needs), Gender, Home (Total HOME, Observed Maternal Cognitive Stimulation)

Child Care Predictors:

Model 1: Hours, type, observed positive caregiving rating

Model 2: Model 1 + observed frequency of language stimulation

	Bracken School Readiness		Reynell Expressive Language		Reynell Vocabulary Comprehended	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Adjusted R^2 for covariates		.316*		.164*		.388*
Adjusted R^2 for all child-care variables		.014*		.014*		.021*
Average hours/week in child care 0-36 mo	ns	ns	ns	ns	ns	ns
# times in center 6, 15, 24, 36 mo	.118*	.137*	.095*	.124*	.142*	.155*
# times in child care home 6, 15, 24, 36 mo	ns	ns	ns	ns	.083*	.093*
Observed rating of positive caregiving 6, 15, 24, 36 mo	.116*	ns	.096*	ns	.148*	.117*
Observed frequency of language stimulation 6, 15, 24, 36 mo	—	ns	—	.123*	—	ns
Total adjusted R^2 for selection, gender, home, child care		.330		.178*		.409*

ns = nonsignificant.
* = $p<.05$
— not in model

Summary of Results

Key Question 1

Does quality of care predict cognitive and language outcomes in the first 3 years of life?

- Yes
  - – Higher child-care quality was consistently related to better outcomes. The unique contribution of the child-care quality variables ranged from 1.3% and 3.6% of the individual differences in cognitive and language performance.
- More positive caregiving rating is related to:
  1. Higher cognitive scores — Bayley at 24 months; Bracken at 36 months
  2. Higher language scores — at all ages

This finding is primarily accounted for by the Frequency of Language Stimulation.

- Higher language stimulation is associated with:
  1. Higher cognitive scores — Bayley at 15 and 24 months; Bracken at 36 months
  2. Higher language outcomes — at all ages

Key Question 2

Do hours in care and type of care predict cognitive and language outcomes in the first 3 years of life?

Number of Hours?

- No
  - – There is no relation between number of hours of care and any of the outcome variables.

Type?

- Yes
  - – After controlling for quality of care
  - Center care predicts better performance on the Bayley at 24 months, on the Bracken School Readiness at 36 months, and on measures of language skill at all three ages.
  - Child-care homes predict better performance on the Bayley at 24 months and on one of two measures of language skill at 36 months.

Key Question 3

Is the relation between child care and cognitive or language outcomes different for boys and girls?

- No
  - – No consistent pattern of interactions between the language stimulation variable and child gender emerged in analyses. One significant interaction was obtained in analysis of the receptive vocabulary at 15 months.

Question 4

Do child-care experiences predict differently for children who vary by:

Family Income?

- No
  - No significant interactions between language stimulation and income-to-needs were found.

Home Environment?

- No
  - No significant interactions between language stimulation and the HOME were found.

Ethnicity?

- No
  - No significant interactions between language stimulation and ethnicity (African Americans, Caucasian) were found.

Conclusions

1. Quality of provider-child interaction at child care is related to better cognitive and language outcome during the first 3 years:

   Across a wide range of child-care settings, positive caregiving and language stimulation contribute between 1.3% and 3.6% of the variance to early cognitive and language development in the first 3 years of life. Despite the significance of these results, it is important to note that all the predictors combined (income-to-needs, mother's vocabulary, mother interaction with the child, family environment, child gender, and child care) accounted for between 5% and 41% of the variance.

   Because our measures of child-care quality are interactional, the association between quality of care and children's outcomes may be due, at least in part, to behaviors elicited by the children and responded to by the child-care providers.

2. The relation between child-care predictors and outcomes is similar for children:
   - *in different types of care*
   - *with different family incomes*
   - *from different home environments*
   - *from different ethnic groups*
   - *of both genders*

3. After controlling for quality of care:

   Children attending center care have higher cognitive and language outcomes than children in other types of care.

4. With quality controlled:

   Participation in child-care homes predicts better performance on the Bayley at 24 months and on Reynell Expressive Language at 36 months.

itive Caregiving Is Associated with Higher Cognitive and Language Performance

For the cognitive and language development of young children, frequency of language stimulation in the child-care setting is the most predictive component of provider-child interaction. Language stimulation accounted for a relatively small proportion of the variance in cognitive and language development, compared with other environmental characteristics (family income, maternal vocabulary, quality of the home environment, and mother-child interaction).

The NICHD Study: Conclusions Across the Two Domains

Overall Summary

Two different domains — mother-child interaction and children's cognitive and language development — were examined for their relations to early child-care experience across the first 3 years of life.

- With selection, child, and family variables controlled, child care made consistent additional contributions to explaining both mother-child interaction and cognitive and language outcomes.
  - For cognitive and language development:
    - Child care experience, especially positive caregiving and language stimulation in the care setting, accounted for 1.3% to 3.6% of the variance in cognitive and language development.
  - For mother-child interaction:
    - Child care, especially amount of care and positive caregiving in the care setting, accounted for .5% to 1% of the variance in mother-child interaction.
- Major findings — Child Care Quality:
  - More positive caregiving and, especially, language stimulation in child care were related to children's better performance on cognitive and language tests when they were 15, 24, and 36 months of age.
  - More positive caregiving in child care was related to more positive involvement of mothers at 15 months and more sensitivity of mothers at 36 months with their children.
- Major findings — Amount of Child Care:
  - More hours of child care was related to less sensitive and engaged mother-child interactions across the first 3 years. These findings seemed to hold particularly for mothers who were not at risk due to poverty or depression.
  - Amount of child care was unrelated to children's cognitive and language development.

In summary, although family, maternal, and child characteristics generally explained a larger proportion of the total variance, child care made additional, though small, contributions to qualities of mother-child interaction and to children's cognitive and language development.

Publications Available from the NICHD Study of Early Child Care

(1993). Child-care debate: Transformed or distorted? *American Psychologist*, 48, 692-693.

(1994). Child care and child development: The NICHD Study of Early Child Care. In S.L. Friedman and H.C. Haywood (Eds.) *Developmental Follow-up: Concepts, Domains, and Methods.* (pp. 377-395). New York: Academic Press.

(1996). Characteristics of infant child care: Factors contributing to positive caregiving. *Early Childhood Research Quarterly*, 11, 269-306.

(Spring, 1996) Child care and the family: An opportunity to study development in context. *Newsletter of the Society for Research in Child Development.*

(in press). Poverty and patterns of child care. In J. Brooks-Gunn & G. Duncan (Eds.) *Consequences of growing up poor.* New York: Russell-Sage.

(in press). The effects of infant child care on infant-mother attachment security: Results of the NICHD Study of Early Childcare. Child Development.

(in press). Family factors associated with characteristics of nonmaternal care for infants. *Journal of Marriage and the Family.*

(in press). Child care experiences during the first year of life. *Merrill-Palmer Quarterly.*

These papers can be obtained by writing to the:

Public Information and Communications Branch
National Institute of Child Health and Human Development
Building 31, Room 2A32
Bethesda, MD 20892-7510

Future Papers from the NICHD Study of Early Child Care

Infant child care and mother-child interaction at 6 and 15 months.

Early child care and self-control, compliance, and problem behavior at 24 and 36 months.

The effects of child care on cognitive outcomes at 15, 24, and 36 months.

The effects of child care on health and growth.

The effects of child care on peer relations at 24 and 36 months.

Predictors of positive caregiving at 15, 24, and 36 months.

Child care and mother-child interaction at 24 and 36 months.

Child care and attachment to mother at 24 and 36 months.

Patterns of child care across the first three years of life.

Early life and child care experiences of Head Start eligible children.

Studying the effects of early child care experiences on the development of ethnic minority children in the US: Towards a more inclusive agenda.

Fathers and child care.

Effects of child care for children from families with psychosocial risk.

Do developmental processes operate differently across child care niches?

Effects of regulable aspects of child care on child outcomes.

Chronicity of maternal depressive symptoms, mother-child interaction, and child outcome.

NICHD Early Child Care Research Network

Mark Appelbaum
University of California at San Diego
(619) 534-7959
(619) 534-7190 fax
mappelba@psy.ucsd.edu

Dee Ann Batten
Vanderbilt University
(615) 343-1476
(615) 343-1100 fax
battenda@ctrvax.vanderbilt.edu

Jay Belsky
Pennsylvania State University
(814) 865-1447
(814) 863-6207 fax
jxb@email.psu.edu

Kimberly Boller*
Mathematica Policy Research Institute
(609) 275-2341
(609) 799-0005 fax
kboller@mathematica-mpr.com

Cathryn Booth
University of Washington at Seattle
(206) 543-8074
(206) 685-3349 fax
ibcb@u.washington.edu

Robert Bradley
University of Arkansas at Little Rock
(501) 569-3423
(501) 569-8503 fax
rhbradley@ualr.edu

Celia Brownell
University of Pittsburgh
(412) 624-4510
(412) 624-4428 fax
brownell@vms.cis.pitt.edu

Margaret Burchinal
University of North Carolina at Chapel Hill
(919) 966-5059
(919) 962-5771 fax
burchina.fpg@mhs.unc.edu

Bettye Caldwell
Arkansas Children's Hospital
Department of Pediatrics
(501) 320-3333
(501) 320-1552 fax
bettyemc@care.ach.uams.edu

Susan Campbell
University of Pittsburgh
(412) 624-8792
(412) 624-5407 fax
preschl@vms.cis.pitt.edu

Alison Clarke-Stewart
University of California at Irvine
(714) 824-7191
(714) 824-3002 fax
acstewar@uci.edu

Martha Cox
University of North Carolina at Chapel Hill
(919) 966-3509
(919) 966-7532 fax
cox.fpg@mhs.unc.edu

Kaye Fendt
National Institute of Child Health and Human Development
(301) 594-5414

Sarah L. Friedman
National Institute of Child Health and Human Development
(301) 496-9849
(301) 480-7773 fax
friedmas@hd01.nichd.nih.gov

Kathryn Hirsh-Pasek
Temple University
(610) 642-5275
(215) 204-5539 fax
v5280e@vm.temple.edu email

Aletha Huston
University of Texas at Austin
(512) 471-0753
(512) 471-5844 fax
achuston@mail.utexas.edu

Elizabeth Jaeger
Temple University
(215) 204-7894
(215) 204-5539 fax
v1547g@vm.temple.edu

Bonnie Knoke
Research Triangle Institute
(919) 541-7075
(919) 541-5966 fax
knoke@rti.org

Nancy Marshall
Wellesley College
(617) 283-2551
(617) 283-2054 fax
nmarshall@wellesley.edu

Kathleen McCartney
University of New Hampshire
(603) 862-3168
(603) 862-4986 fax
kathleen.mccartney@unh.edu

Marion O'Brien
University of Kansas
(913) 864-4840
(913) 863-5202 fax
mobrien@falcon.cc.ukans.edu

Margaret Tresch Owen
University of Texas at Dallas
(972) 883-6876
(214) 883-2491 fax
mowen@utdallas.edu

Robert Pianta
University of Virginia at Charlottesville
(804) 243-5483
(804) 243-5480 fax
rcp4p@virgina.edu

Deborah Phillips
National Academy of Sciences
(202) 334-1935
(202) 334-3829 fax
phillips@nas.edu

Henry N. Ricciuti*
Cornell University
(607) 255-0844
(607) 255-9856 fax
hnr1@cornell.edu

Susan Spieker
University of Washington at Seattle
(206) 543-8453
(206) 685-3349 fax
spieker@u.washington.edu

Deborah Lowe Vandell
University of Wisconsin at Madison
(608) 263-1902
(608) 263-6448 fax
dvandell@macc.wisc.edu

Kathleen Wallner-Allen*
Research Triangle Institute
(301) 496-9849
(301) 480-7773 fax
wallnerk@hdo1.nichd.nih.gov

Marsha Weinraub
Temple University
(215) 232-6572
(215) 204-5539 fax
v5242e@vm.temple.edu

* Affiliated with the NICHD during the course of the Early Child Care Study.

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